STRUCTURAL INHERITANCE IN THE SOUTHERN KIRTHAR FOLD BELT

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Field data, seismic evidence and the results of recent drilling in the southern Kirthar Fold Belt (KFB) have revealed that the location and magnitude of many of the large fold structures can be attributed to inversion of an earlier set of normal faults. Our current analysis suggests that Jurassic rifting produced a rift zone in the west flanking a stable platform with only minor faulting to the east. This structural template had a profound effect upon the sedimentation patterns and structural growth of the younger cover sediments.

Evidence for Jurassic normal faults is seen in the Jurassic Shirinab Formation of the Mor and Kulri Ranges in the western part of the fold belt where carbonate debris flows and massive slump blocks record syn-depositional, fault-related fragmentation of the margin of the carbonate platform to the east. Examples of these faults show evidence of inversion with contractional structures in both footwall and hangingwall yet with overall net extension.

East of the Mor Range, Jurassic outcrop is absent. Seismic data indicates that the Jurassic platform is not affected by major faults. Yet facies trends in the Tertiary cover sediments and the location of Tertiary compressional structures appear to be influenced by the location of earlier extensional faults. The Chapar- Andhar High is flanked by an orthogonal system of faults which has controlled the dimensions of the Eocene carbonate platform that underlies the structure. The trend of these faults is parallel and perpendicular to the Jurassic faults recorded in the western KFB (NNWSSE and ENE-WSW). The main Eocene platform margin on the Gorag Ridge to the east is very abrupt and consistent in strike suggesting fault control. These observations are consistent with sub-seismic scale Jurassic faults being present on the platform.

The main inversion event took place during Plio- Pleistocene collision. However an important phase of earlier inversion occurred in the Late Palaeocene related to the emplacement of the Bela Ophiolite onto the margin of the Indo-Pakistan Plate in the Kirthar area. Seismic evidence demonstrates that substantial accommodation space was generated during loading of the passive margin by ophiolite emplacement. Subsequent infill of this marine 'foreland basin' is reflected in the rapid westward thickening of Sequence T20 within the foldbelt. Subsequent pre-collisional inversion events have been recorded in the Early Oligocene and Early Miocene and are attributed to transfer of stress through the plate from the Himalayan collision zone, dating from the Early Eocene.

Despite the evidence for repeated Tertiary inversion of earlier normal faults, this is not thought to be the main cause of structural elevation of the mountain belt. Instead this is attributed to thick skinned buckle folding at a crustal scale.